

## OUR ASTRONOMICAL COLUMN.

REDISCOVERY OF FINLAY'S COMET (1906d).—A telegram from the Kiel Centralstelle announces the rediscovery of Finlay's comet by Herr Kopf on July 16. The position of the comet at 13h. 14.4m. (Königstuhl M.T.) on that date was:—

R.A.=23h. 38.3m., dec.=14° 3' S.

The object is stated to be a bright one. Subjoined is an extract from the approximate ephemeris published by Herr Schulhof in No. 4100 of the *Astronomische Nachrichten*:—

12h. M.T. Paris.			
1906	$\alpha$ (true) h. m.	$\delta$ (true) ° ' "	log $\Delta$
July 16 ... ..	23 44 ...	-13 7 ...	9.5443
18 ... ..	23 57 ...	-12 10 ...	9.5254
20 ... ..	0 11 ...	-11 6 ...	9.5073
22 ... ..	0 25 ...	-9 56 ...	9.4902
24 ... ..	0 40 ...	-8 40 ...	9.4744
26 ... ..	0 56 ...	-7 17 ...	9.4602
28 ... ..	1 13 ...	-5 47 ...	9.4478
30 ... ..	1 30 ...	-4 12 ...	9.4376
Aug. 1 ... ..	1 47 ...	-2 33 ...	9.4299

A comparison of the observed and computed places on July 16 will give an approximate value for the corrections to be applied to the ephemeris positions. When rediscovered, the comet was about one degree north of  $\omega$  Aquarii; at present (July 19) it is presumably about five degrees north of 2 Ceti, and is travelling in a north-easterly direction, so that it now rises above the south-east horizon at about 11.30 p.m.

THE ORBIT OF CASTOR.—An interesting paper on the quadruple system of Castor, by Dr. H. D. Curtis, appears in No. 5, vol. xxiii., of the *Astrophysical Journal*.

The discussion is based on the results obtained from a number of spectrograms, of each of the two double systems, taken with the Mills spectrograph at the Lick Observatory. For the fainter component,  $\alpha_1$ , of the visual system, the final elements deduced give the period as 2.928285 days, the eccentricity as  $0.01 \pm 0.0066$ , and the velocity of the system as  $-0.98 \pm 0.15$  km. The comparison of these elements with the observational results shows a satisfactory agreement. Reducing the observational results for the brighter component,  $\alpha_2$ , Dr. Curtis obtained a final set of elements which give the period as 9.218826 days, the eccentricity as  $0.5033 \pm 0.0112$ , and the velocity of the system as  $+6.20 \pm 0.17$  km.

Combining these results with those obtained for the visual system, it should become possible to obtain values for the parallax, masses, and other physical constants of this remarkable quadruple system, but the visual results, as shown in a table given by Dr. Curtis, are as yet so indeterminate that any values so obtained could not be looked upon as being in any way final. The relative velocity of the two components as derived from Dr. Curtis's discussion is  $7.14 \pm 0.23$  km., and, taking Prof. Doberck's period of 347 years for the visual system, this would indicate a parallax of  $0''.05$ . On a similar assumption the semi-major axes of the two systems are as follow:—

$\alpha_1$  Geminorum,  $a = 1,435,000$  km.  
 $\alpha_2$  „ „ „  $a = 1,667,000$  „ „

Although these results are mere hypotheses, they give some idea of the magnitude of each system, and show that they are probably of about the same dimensions.

PLANETS AND PLANETARY OBSERVATIONS.—In the first of a series of articles on "Planets and Planetary Observation" which he is contributing to the *Observatory*, Mr. Denning discusses the general problems to be attacked and also the instrumental equipment necessary for the work. After discussing the relative merits of refractors and reflectors, he points out that no amateur observer should be discouraged because he possesses only a relatively small instrument, and states that none of the largest telescopes yet employed in this branch of astronomy shows anything beyond what is readily distinguishable in an 8-inch glass.

## THE SANITARY CONGRESS AT BRISTOL.

THE twenty-third Congress of the Royal Sanitary Institute was held at Bristol during the week ending July 14. Sir Edward Fry presided. The proceedings of the congress comprised the usual general meetings; meetings in three sections, (1) sanitary science and preventive medicine, (2) engineering and architecture, (3) physics, chemistry, and biology; and meetings of conferences of various classes of persons interested in sanitary science. This year there were conferences of municipal representatives, under the presidency of Councillor Colston Wintle, chairman of the health committee of the City of Bristol, who took a prominent part in the proceedings of the congress; of medical officers of health, under Dr. D. S. Davies, medical officer of health, Bristol; of engineers and surveyors to county and other sanitary authorities, under Mr. H. Percy Boulnois, of the Local Government Board; of veterinary inspectors, under Mr. Frank Leigh; of sanitary inspectors, under Mr. A. E. Hudson, chief sanitary inspector, Cheltenham; of women on hygiene, under Miss Mary Clifford, in the absence of the Duchess of Beaufort; and also a conference on the hygiene of school life, under the presidency of the Bishop of Hereford.

In the presidential address to the congress on Monday, July 9, Sir Edward Fry dealt clearly and concisely with the general history of sanitary works and the regulation of public health. After pointing out the increase of duties and responsibilities which had devolved upon the heads of modern households and upon local authorities in consequence of the recent developments of sanitary science, he referred in turn to the sanitary ordinances of the Greeks, the Jews, and the Romans up to the disappearance of all thought of sanitary science in the ruin of the Western Empire. Finally, he referred to the legislation on the subject in Great Britain since the middle of last century.

Sir W. J. Collins, president of Section I., sanitary science and preventive medicine, was detained in London by urgent parliamentary duties, and the address was read by Dr. Shingleton Smith. It protested against the too exclusive consideration of bacteriology, and appealed for greater attention to be paid to the soil in which bacteria are implanted, and upon which they depend for their development. In Section II., engineering and architecture, the president, Mr. Edwin T. Hall, referred to a number of points in which the architect could assist the promotion of sanitation by the design of buildings. Dr. W. N. Shaw, president of Section III., physics, chemistry, and biology, took for his subject climate and health. After referring to the work of Sir Arthur Mitchell, Dr. Buchan, and Dr. Longstaff, he indicated the climatological material available for the study of questions upon the relation of health to climate, and discussed the methods of using it. In the course of the address he showed a meteorological section of the British Isles from north to south, Sumburgh Head to Hastings, and another from west to east, Valencia to Margate. He also exhibited some interesting diagrams of the average diurnal variation of relative humidity for certain selected months at four observatories in the United Kingdom, and some autographic records of the same element at Cambridge, showing remarkable fluctuations of humidity within the period of twenty-four hours.

The subjects of the addresses at the various conferences and of the papers and discussions were for the most part of a technical character. Questions concerning milk supply and its regulation were raised in Section I. by Dr. J. Fortescue-Brickdale and by Mrs. C. Hamer Jackson, at the conference of medical officers of health by Prof. H. Kenwood, and at the conference of veterinary inspectors by Dr. W. G. Savage and by Mr. J. S. Lloyd. The question of dust, particularly of motor dust, also came up in various forms. In the conference of engineers it was raised by a paper by Mr. A. P. I. Cotterell, and in Section III. the influence of dust on health was a subject of discussion opened by Dr. P. Boobyer. Of the suggestions made for dealing with the question, some of them could only be called fantastic. The discussion of various aspects of the bacterial treatment of sewage also found a place in several sections or conferences. The necessity for the extension of



employment of women as health visitors or in other ways in connection with the carrying out of provisions for public health also appeared on more than one occasion.

Subjects to be treated from the more specially scientific standpoint fall, as a rule, to Section I., sanitary science and preventive medicine, or to Section III., physics, chemistry, and biology. In the former, Fleet-Surgeon Bassett-Smith suggested various ways in which disease might be disseminated in a paper on present knowledge of the etiology of Mediterranean fever, with special reference to the Royal Navy. The other papers were by Dr. R. S. Marsden, on scarlatina and certain other diseases in relation to temperature and rainfall; by Dr. J. Fletcher, on post-scarlatina diphtheria and its prevention; and by Dr. F. T. Bond, on some points of interest in the treatment of outbreaks of diphtheria. In Section III., besides the discussion on the influence of dust, may be mentioned a paper by Prof. M. Travers, F.R.S., on the absorption of gases in solids, which showed how, following the analogy of the absorption of carbonic anhydride by carbon, the absorption of water vapour by wool and by cotton varied with the pressure of the vapour up to saturation point, and also how the absorption of water vapour by cotton at the same pressure diminished with increase of temperature.

Mr. J. H. Johnston described some experiments upon the determination of the amount of organic colloids in sewage and their partial removal by surface action. Mr. J. W. Lovibond sought for a more precise chemical definition of "pure beer," and indicated the use of his tintometer to identify the quality of beers. Dr. Rideal described the effect of copper sulphate in preventing the growth of algae in water supplies, and proposed the use of electrolytic chlorine for the purpose. The other papers were of a technical character.

In an evening lecture Prof. Lloyd Morgan set forth very clearly the distinction to be drawn between the deterioration of the individuals composing a race and the degeneration of the stock, and dealt with the bearing of the theory of evolution upon the question of degeneration. A popular evening lecture was also given by Baillie Anderson, of Glasgow, on the wastage of human life.

Ample provision was made for the entertainment of those attending the congress by visits to works and institutions in the neighbourhood, as well as by garden-parties or excursions to the numerous places of interest in the district. The excellence of the arrangements and the smoothness of the working were effective testimony to the admirable organisation of the congress as carried out by a local committee with Councillor Colston Wintle as chairman and Mr. T. J. Moss-Flower as secretary, in conjunction with the officers of the Sanitary Institute, of whom Colonel Lane Notter is chairman of council, Mr. W. Whittaker, F.R.S., chairman of the congress committee, and Mr. E. White-Wallis secretary.

#### MIGRATIONS INTO NEARER AND FURTHER INDIA.<sup>1</sup>

It was philologists who first borrowed the name "Dravidian" from Sanskrit and applied it to a well-known family of languages, mostly spoken in southern India, but of which an interesting member, Brâhûi, is found far to the north-west, in Baluchistan. In the hills of Central India, to the north of the main Dravidian group, there is another and totally distinct family of languages which philologists call "Mundâ."

It happens that the speakers of the south-Indian Dravidian languages and the speakers of Mundâ languages possess a common ethnic type—nose thick and broad, low facial angle, thick lips, wide, fleshy face, low stature, figure squat and sturdy, skin dark, and so on. This ethnic type ethnologists have called "Dravidian," an unfortunate piece of nomenclature, for (1) if language can ever be taken as a criterion of race, speakers of Mundâ languages are certainly different in racial origin from the speakers of Dravidian, and (2) some speakers of Dravidian languages, the Brâhûis, do not possess the so-called Dravidian ethnic

type, but possess that of the Iranians. At any rate, if we put the Brâhûis out of consideration for the present, it is better to name the ethnic type "Mundâ-Dravidian," i.e. the type common to the people known as Mundâs and to the people known as "South-Indian Dravidians." The type is almost certainly a mixed one. Judging from the fact that all Mundâs possess it, and that it is not possessed by all Dravidians (witness the Brâhûis), the probability is that the Mundâ-Dravidian ethnic type belongs mainly to the Mundâs, and has been acquired through intermarriage by Dravidians originally endowed with a less persistent type.

When the Aryans entered India they found it inhabited by people of the Mundâ-Dravidian type. The Aryans were the more highly civilised, but as they migrated further and further into the country they intermarried with the people, and themselves commenced to acquire their physical characteristics while they retained their own language and customs, which they in turn imposed upon the Mundâ-Dravidas with whom they came in contact. We see traces of the same interchange occurring even at the present day between the Dravidians and the Mundâs. The Nahâls of the Mahâdeo Hills were once a Mundâ tribe. They came into contact with the relatively more civilised Dravidians, and adopted a mixed speech in which Dravidian predominated. Nowadays this tribe is coming under Aryan influence, and is adopting an Aryan language.

It is impossible to say whether the Mundâs or the Dravidians, or both, were aborigines of India or not. Assuming that the Dravidians were immigrants, the probability is that they entered the country from the south, and not from the north-west, as was maintained by Caldwell and others. Relationship has been alleged, with some appearance of truth, between the Dravidian languages and those of New Guinea and Australia. This subject has not yet been thoroughly gone into, and is at present under examination, but the above seems to be the conclusion which will most probably be reached.

As for the Mundâs, if they were immigrants, they must certainly have entered India proper from the north-east. Pater Schmidt, of Vienna, who attacked the question from without, and the Linguistic Survey of India, which has approached it from within, have arrived at the same result. There was once a race spread widely over Further India of which we find remains amongst the forest tribes of Malacca, in Pegu and Indo-China, and along the Mé-kong and Middle Salwin. The languages which they speak are members of what is known as the Môn-Khmêr family. Forms of speech closely connected with Môn-Khmêr are Nicobarese, Khasi (spoken in the central hills of Assam), and the various Mundâ tongues of India proper. That there is an ultimate connection between these widely separated languages must now be taken as firmly established by the latest researches of comparative philology. The matter admits of no further doubt. But this is not the limit of the discoveries. The languages of the Himalaya are, it is well known, Tibeto-Burman in character. Nevertheless, there are dialects spoken on the southern slope of these mountains, from Kanâwar in the Punjab almost to Darjeeling, which have a basis similar to this old Mundâ-Nicobar-Môn-Khmêr-Khasi language, that has been, so to speak, overwhelmed, but not entirely hidden, by a layer of Tibeto-Burman. Then, on the other side, Pater Schmidt has shown an intimate connection between Môn-Khmêr and the languages of the south-eastern Pacific, so that there is evidence to show the existence in very early times of a people and a group of speeches extending from the Punjab right across northern India and Assam down to the extreme south of Further India and Indo-China, and thence across Indonesia, Melanesia, and Polynesia up to Easter Island, which is not so very far from the coast of South America.

In India, Nearer and Further, the fate of these speeches has been the same. In Nearer India the Mundâ languages, which were certainly once spoken in the northern plains, have been driven to the hills by Dravidians or Aryans. In Assam and Burmah the Khasis and Môn-Khmêrs have been either driven to the hills, where they survive as islands in a sea of alien tongues, or else to the coast of Pegu by the Tibeto-Burmans, and in Indo-China the Môn-Khmêrs have again been driven to the sea-board by the Tais.

<sup>1</sup> Extension of part of a paper on "The Languages of India and the Linguistic Survey," read before the Society of Arts on March 15 by Dr. G. A. Grierson.